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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,179	09/18/2003	Takahashi Migaku	FUK-12CPA	8778

7590 07/19/2005

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EXAMINER	
MCDONALD, RODNEY GLENN	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 07/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/666,179	MIGAKU, TAKAHASHI	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Preliminary amendment filed 9-18-03*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9-18-03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kano "Metastable Fe Nitrides with high Bs prepared by Reactive Sputtering", J. Appl. Phys. 53 (11), November 1982, pp. 8332-8334.

Kano teaches a magnetic thin film manufacturing method comprising introducing argon and nitrogen into a chamber holding a substrate (page 8332, under Experimental Procedure lines 1-7); applying DC power to an iron target in the atmosphere (page 8332, second column, lines 9-12). Furthermore the substrate temperature is less than 200 degrees Celsius (page 8332, second column, lines 5-8). Therefore, since the substrate temperature is below 200 degrees Celsius and the iron target is sputtered in an argon and nitrogen atmosphere via DC power, Kano will inherently generate the same nitrogen martensite α' phase. The nitrogen gas flow percentage is within the claimed range of 1-25 %. (Fig. 1) The presence of an α' Fe film is taught. Kano also teach heat treating the film (page 8333, lines 28-36; Fig. 4)

It is clear that Kano teaches that, with respect to a $Fe_{16}N_2$ film, it is inherent that the temperature be below 200 degrees Celsius to prevent the film from decomposing (page 8333, lines 41-47) Furthermore, since Kano discloses the importance of the

$Fe_{16}N_2$ film (Page 8332, under subheading "Introduction", lines 13-15) and that temperatures above 200 are undesirable due to the adverse effects such a temperature range would have on a $Fe_{16}N_2$ film, and that the instant application employs the same process conditions to obtain a desired crystalline phase, Kano will inherently generate the same crystalline phase.

The differences between Kano and the present claims is that the use of a dual target sputtering mechanism is not discussed, the deposition rate is not discussed, the electron temperature and the electron density range is not discussed.

Kano discloses that although through example, a single target system is utilized, a dual target sputtering system was also employed for the nitrogen reactive sputtering to synthesize iron nitrides (first page, first column of Kano)

Kano appears to exemplify a deposition rate of 1000 Angstroms/min (see Front page second column of Kano). While Kano does not appear to disclose that the film is formed at a rate of approximately 200 Angstroms/min, selection of slower sputter rates than 1000 Angstroms/min would have been obvious variants and such modifications of the sputtering rate would have been obvious to one of ordinary skill in the art. Generally, the differences in ranges would not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges critical. In re Aller, 220 F. 2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschle, 406 F. 2d 1403, 160 USPQ 809 (CCPA) 1969).

Kano discloses depositing the iron nitride under the same conditions as the instant invention to generate the same iron nitride compound. Having disclosed such

conditions, it is the examiner's position that the method and apparatus of Kano will generate a plasma which has at least a portion of which exhibits both the claimed electron temperature and electron densities which will overlap or encompass the instantly claimed electron density range, absent clear evidence to the contrary.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a dual target sputtering target and to have selected the desired deposition rate, electron temperature and electron density range since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claims 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kano as applied to claims 10 and 11 above, and further in view of Komuro (Japan 62-164868).

The difference not yet discussed is that the use of a thin film base layer of iron is not discussed.

Komuro teach utilizing a base layer of iron for alternately laminated layers having Fe_8N in the stack. (See Abstract)

The motivation for utilizing iron as a base layer is that it allows for producing a layer stack with high magnetic moment. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized iron as a base layer as taught by Komuro because it allows for producing a layer stack with high magnetic moment.

Claims 13, 14 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kano as applied to claims 10 and 11 above, and further in view of Watanabe (U.S. Pat. 5,154,983).

The difference not yet discussed is the vacuum heat treating and the time for heat treating.

Kano already recognizes heat treating. (See Kano discussed above) Watanabe teach heat treating in vacuum. (See Watanabe Column 6 lines 49-51) As to the time range since the same film is being produced the time range for annealing must be the same.

The motivation for heat treating in vacuum is that it allows for effecting the coercive force. (Column 6 lines 49-51)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have heat treated in vacuum as taught by Watanabe because it allows for effecting the coercive force.

Claims 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kano as applied to claims 10 and 11 above, and further in view of Fujimori (Japan 59-45911).

The difference not yet discussed is wherein the iron nitride film contains an α'' crystalline phase ($Fe_{16}N_2$).

Kano discussed above teaches a small amount of $Fe_{16}N_2$ existing in the alpha phase of Fe when depositing on substrates at lower temperatures. (See page 8334,

second column) Fujimori teach reactive sputtering at low temperatures such that a film can be deposited containing $Fe_{16}N_2$. (See Abstract)

The motivation for depositing a film containing amounts of $Fe_{16}N_2$ is that it allows for production of a high-performance magnetic material. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have deposited a film having amounts of $Fe_{16}N_2$ as taught by Fujimori because it allows for production of a high-performance magnetic material.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kano in view of Watanabe as applied to claims 10, 11, 13, 14 and 18 above, and further in view of Komuro (Japan 62-164868).

The difference not yet discussed is utilizing a base layer of alpha-Fe.

Komuro teach utilizing a base layer of iron for alternately laminated layers having Fe_8N in the stack. (See Abstract)

The motivation for utilizing iron as a base layer is that it allows for producing a layer stack with high magnetic moment. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized iron as a base layer as taught by Komuro because it allows for producing a layer stack with high magnetic moment.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kano in view of Komuro as applied to claims 10, 11, 12, 16 above, and further in view of Watanabe (U.S. Pat. 5,154,983).

The difference not yet discussed is utilizing a vacuum for heat treating.

The difference not yet discussed is the vacuum heat treating and the time for heat treating.

Kano already recognizes heat treating. (See Kano discussed above) Watanabe teach heat treating in vacuum. (See Watanabe Column 6 lines 49-51) As to the time range since the same film is being produced the time range for annealing must be the same.

The motivation for heat treating in vacuum is that it allows for effecting the coercive force. (Column 6 lines 49-51)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have heat treated in vacuum as taught by Watanabe because it allows for effecting the coercive force.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kano in view of Komuro as applied to claims 10, 11, 12, 16 above, and further in view of Fujimori (Japan 59-45911).

The difference not yet discussed is wherein the iron nitride film contains an α'' crystalline phase ($Fe_{16}N_2$).

Kano discussed above teaches a small amount of $Fe_{16}N_2$ existing in the alpha phase of Fe when depositing on substrates at lower temperatures. (See page 8334, second column) Fujimori teach reactive sputtering at low temperatures such that a film can be deposited containing $Fe_{16}N_2$. (See Abstract)

The motivation for depositing a film containing amounts of $Fe_{16}N_2$ is that it allows for production of a high-performance magnetic material. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have deposited a film having amounts of $Fe_{16}N_2$ as taught by Fujimori because it allows for production of a high-performance magnetic material.

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kano in view of Watanabe as applied to claims 10, 11, 13, 14 and 18 above, and further in view of Fujimori (Japan 59-45911).

The difference not yet discussed is wherein the iron nitride film contains an α" crystalline phase ($Fe_{16}N_2$).

Kano discussed above teaches a small amount of $Fe_{16}N_2$ existing in the alpha phase of Fe when depositing on substrates at lower temperatures. (See page 8334, second column) Fujimori teach reactive sputtering at low temperatures such that a film can be deposited containing $Fe_{16}N_2$. (See Abstract)

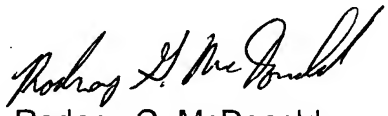
The motivation for depositing a film containing amounts of $Fe_{16}N_2$ is that it allows for production of a high-performance magnetic material. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have deposited a film having amounts of $Fe_{16}N_2$ as taught by Fujimori because it allows for production of a high-performance magnetic material.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
July 14, 2005